May 1975 B75-10074

# NASA TECH BRIEF

*Langley Research Center*



## Airfoil Disperses Smokestack Effluents Upward

A new airfoil system, when mounted on the smokestacks of power-generating plants, steel mills, houses, trucks, ships, and the like, will disperse effluents upward and reduce pollution at ground level. A horizontal wind at a smokestack, either on a moving vehicle or fixed, will form the smokestack effluents into a long smoke plume near the ground. Pollution levels near the ground downstream of the smokestack and in the area of the smoke plume will tend to be very high.

The new system consists of a negative-lift airfoil mounted at or near the top of a smokestack in such a manner as not to obstruct the flow of effluents from the stack. The system has controls for adjusting the negative lift and drag of the airfoil, for changing the orientation of the airfoil to maintain proper airflow over the foil, and for adjusting its vertical location with respect to the top of the smokestack. In use, the airfoil is oriented approximately perpendicularly to the relative wind direction and is adjusted so that wind flowing over the airfoil generates negative lift or a downward force on the foil. Tip vortices form at the ends of the airfoil and extend far downstream. Because the airfoil is set for negative lift, the mutual interaction of the tip vortices causes them to ascend with respect to the ambient air. As the tip vortices slope upward from the airfoil, the effluents are carried along until the vortices disintegrate, and the smoke plume diffuses far downstream.

The airfoil and controls used in this system may take a variety of forms. The airfoil and a vertical tail fin could be mounted on a freely revolvable carriage, thus controlling orientation and angle of attack. The orientation and angle of attack could also be set by a servomechanism controlled by a remote wind sensor. In other instances, crossed airfoils could be used for flow in either direction, and two or more closely related smokestacks may be fitted with connecting and end airfoils.

**Note:**

Requests for further information may be directed to:

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**Patent status:**

Inquiries concerning rights for the commercial use of this invention should be addressed to:

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